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ABSTRACT

Research which has investigated factors affecting pupils' attitudes toward school subjects is reviewed, examining descriptive, correlational, and experimental research on students' attitudes toward several different school subjects at various grade levels. Although many weaknesses exist in the methodology and theoretical basis of much of the research, several conclusions are warranted. The teacher, through personal enthusiasm, relationships with students, and the establishment of a positive classroom learning environment, is seen as an important factor in affecting attitudes. Reward-giving is not clearly related to attitude development, and instructional methods or curricula do not seem to influence attitudes significantly. (A bibliography is appended.) (Author/MH)

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Attitudes Toward School Subjects: A Review of Influences[1]

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Attitudes Toward School Subjects:
A Review of Influences

Abstract

This review is a summary of research which has investigated factors affecting pupils' attitudes toward school subjects. The review examines descriptive, correlational and experimental research of attitudes toward several different school subjects. Although many weaknesses exist in the methodology and theoretical basis of much of the research several conclusions seem warranted. The teacher, through personal enthusiasm, relationships with students, and the establishment of a positive classroom learning environment, seems to be an important factor which affects attitudes. Reward giving is not clearly related to attitude development, and instructional methods or curricula do not seem to significantly influence attitudes.

This review is a summary of recent research relating pupil attitudes toward school subjects with factors which are purported to affect their development. The importance of developing students' positive attitudes toward the subject matter has been recognized for many years, yet little research has been conducted to determine the most influential factors (Aiken, 1970; Bloom, Hastings and Madus, 1971; Kahn and Weiss, 1973). The review is limited to attitudes toward school subjects because they are directly associated with achievement in subjects[2] and will influence future use of and regard for subject areas. Attitudes toward school and learning are also important but indicate generalized reactions toward many aspects of schooling. Such attitudes are not related to achievement in subject areas (Jackson, 1968) and are not included in the review. For the purpose of this discussion, "attitude" is defined generally, as a predisposition to approach or avoid, like or dislike, value or not value the subject. This definition is necessary since many studies either used the term in a non-specific manner, did not define "attitude," or used instruments which measured the construct in its broadest sense.

[2]McMillan (1976) has cited research which seems to establish a positive relationship between achievement in and attitudes toward school subjects.

The research related to the development of students' attitudes toward school subjects can be classified into three types. One category includes studies which seek to identify factors affecting attitude formation. This includes reviews, surveys asking students how they have developed certain attitudes, questionnaires, and other forms of study which probe for variables related to attitude formation. A second type of research is correlational in nature and relates aspects of the school environment or students' backgrounds to attitudes. The third kind of research tests in a more rigorous manner the impact of selected variables on attitude development. These studies go beyond the descriptive research of the first two types in an attempt to specify the causes of attitudes.

Research to Identify Influential Factors

Aiken (1970), in a comprehensive review of literature since 1960 on attitudes toward mathematics, suggested that the attitude of the teacher toward mathematics is the single most important determiner of student attitudes toward the subject. In several studies the impact of the teacher was shown to be greater than ability grouping and different curricula. Aiken also pointed out that an emphasis on relevance, meaningfulness and games will increase positive attitudes, as will simply getting a student to associate mathematics with something pleasant. The final factor Aiken stressed is enabling the student to feel successful. Students who consistently fail in a subject lose self-confidence and develop a dislike for the subject. Aiken identified success as the reward students receive, and suggested that learning should be structured so that the student feels competent with the subject. Aiken

did not discuss how grade giving and other forms of feedback from the teacher affect student feelings of success.

In a later review of attitudes toward mathematics, Aiken (1976) concluded that "changes in attitudes toward mathematics involve a complex interaction among student and teacher characteristics, course content, method of instruction, instructional materials, parental and peer support, and methods of measuring these changes" (p. 302). In particular, Aiken stated that certain personality characteristics of students such as self-concept, achievement motivation, intuitiveness, and attitudes of parents are related to attitudes toward mathematics. Specific methods or courses have not had a significant impact on college, elementary or secondary students' attitudes toward mathematics. Aiken cited several studies which do not support the contention that the teachers' attitudes are related to pupils' attitudes, but stated that the research, overall, supports the impact of teachers' attitudes. Studies of the use of calculators and other instructional devices gave conflicting results, and behavior modification techniques were generally successful in reducing anxiety toward mathematics. The reviews by Aiken show that the number of studies on mathematics attitudes has increased sharply over the past ten years. However, generalizable conclusions are less evident. While the teacher seems to be the most important classroom variable, there are many conflicting results. This is due, in part, to different instrumentation and definitions of "attitude," varying degrees of sophistication in research design, comparing results across grade levels, and the interaction of personality factors with attitudes. Aiken cites the most

serious problem with research in the area:

> Regardless of the efforts of this writer and others to bring to the educational research community periodic reviews of studies concerned with attitudes and anxiety toward mathematics, many investigators in this area continue to be unaware or unappreciative of previous research on the topic. For example, one recent paper discusses the topic of "mathophobia" as if nothing had been written about its development and measurement (Lazarus, 1974). This oversight is almost certainly due to a failure to search the relevant literature, the first step in any scientific inquiry. (page 293)

Fox (1976) has summarized the results of several studies concerned with sex role socialization and the development of student attitudes. She concludes that for girls, perceptions of parental expectations and maternal attitudes toward mathematics appear to be important in the formation of attitudes. Some evidence was also reported which showed a relationship between maternal attitudes and boys' attitudes toward math. Fox believes sex role stereotyping by teachers teaching strategies and curriculum may influence attitude development, especially negative attitudes of females, but states that there is little direct evidence of the effect of these factors. She maintains, further, that the impact of teachers may be most potent for extreme attitudes, that a very bad or very good experience with a teacher will probably have more impact than most everyday interactions.

Several studies suggest that school-related attitudes are influenced before the student begins school, and that these prior attitudes have an important impact on subsequent attitude development. Poffenberger and Norton (1959) questioned 390 University of California freshmen concerning their attitudes toward mathematics and the attitudes

and expectations of their parents. They found that the student attitudes were positively related to the fathers' attitudes toward mathematics and the expectations for achievement in mathematics held by both parents. Aiken (1972) also found a high correlation between the attitudes of students and parents. Osborn (1971), in a sample of 398 high school students, concluded that student attitudes toward educational achievement was positively related to the educationals level of their parents. Hansen (1969) found that fourth graders' attitudes toward reading was positively correlated with the extent of parent involvement with the child's reading activities: showing concern, encouragement, interest, and giving help. Ramsett, Johnson and Adams (1974) studied three college economics classes. They used regression analysis to conclude that prior attitudes were most highly related to measures of the attitudes toward economics taken at the completion of the course. Cangenmi (1972) found the same results in college chemistry. Ryan (1968) researched the effects of modern and conventional mathematics curricula on student attitudes of 126 pairs of ninth grade classes. Each teacher taught one conventional and one modern class. Teacher grade-giving and curriculum materials did not account for different student attitudes. Ryan found that prior attitudes toward mathematics accounted for attitude differences. Heikkinen (1973) concluded from a study of high school students' attitudes toward chemistry that previous attitudes accounted for most of the difference between students who report positive attitudes and those who indicated negative attitudes toward different instructional procedures.

Callahan (1971) took an informal survey of 366 eighth grade students, asking them to give reasons for liking or disliking mathematics. The most frequent reasons stated for liking math including "needed for life, interesting, fun, and good teachers" while reasons for disliking math were "not good in math, boring, no value." A study by Namazi (1969) found similar results. Namazi asked 1,170 fifth and sixth grade students to recall "critical" moments in their school experience which affected their attitude toward physical education. The pupils reported that teachers who used demonstration and explanation, provided a variety of games and activities, and in general did something to provide fun and enjoyment had the most positive impact on their attitudes. Using the same approach, Bruckerhoff (1977) asked 191 high school students about experiences that influenced whether they liked or disliked reading. Experiences related to teachers seemed to have the most impact, followed by the amount of work involved, and reactions of family members. Teachers who gave personal attention, recognized students as individuals and showed interest positively influenced attitudes. If reading required a lot of work or was perceived to be "too hard," negative attitudes were developed. These studies seem to indicate that classroom activities which depend upon teacher behavior may influence attitude formation.

Knaupp (1973), in summarizing studies related to children's attitudes toward mathematics, also concluded that class activities would influence student feelings toward math. He concluded that attitudes toward mathematics appear to be established early in the child's school experience, during the primary grades.

Moore (1973) randomly selected a national sample of 373 tenth, eleventh, and twelfth grade students to determine predictors of student attitudes toward science and scientists. He found that sex of student, the impression of the teacher as "liked" or "smart," and self-concept of present and future academic ability were significant predictors. This study confirms the findings of other research. Self-concept is a factor similar to parental influence since it is determined prior to a school experience, while the teacher is confirmed as the most important variable in the classroom. Haney (1964), in a study of high school students' attitudes toward science, found that the teacher is more important than sex of student, SES, I.Q., or G.P.A. in changing science attitudes.

In other studies of science attitudes, Hasan (1975) and Gardner (1975) found significant differences between high and low interest high school students. Hasan studied the influence of instruction, peers, home, and individual characteristics of students of 340 eleventh grade science students and found that positive attitudes were related to science teachers who were concerned with students' questions and showed personal interest in students, and that some science readings and activities were influential. Gardner concluded that the effects of teachers and peers was greater than curricula in students' attitudes toward physics.

McMillan (1976) reviewed 124 dissertations written between 1969 and 1975 which studied factors related to pupil attitude formation toward school subjects. He found that 84% compared different instructional approaches, but very few of those reported significant differences.

Most significant relationships resulted from studies of teacher behavior and student-related variables such as self-concept, background, parents, and previous attitudes. His conclusion was that research comparing two or three types of curriculum, textbook, class structure, set of objectives, etc., was generally not related to attitude formation. Rather, positive self-concept, teacher enthusiasm toward and knowledge of the subject, positive attitudes of parents, and favorable attitudes in the past consistently resulted in significant relationships with attitude formation. This represents a non-experimental artifact, however, and it is not clear whether the various factors caused the attitudes or the attitudes resulted in positive self-concept, perception of teacher enthusiasm, etc.

In a review of attitudes toward reading, Alexander and Filler (1976) reached several conclusions with regard to variables associated with attitude development. They cited several studies which show some relationship between achievement and attitudes, and suggested that certain instructional methods and programs may improve attitudes. Student self-concept and teacher and parent interests, attitudes, and interaction with students may affect attitudes toward reading. In a less extensive review of studies, Squire (1969) indicated that liking or disliking reading may depend on the interaction between background factors revealed in interest "preferences" and reading materials. Squire generalized from several studies to suggest that the nature in which reading is discussed may affect student attitudes but that most findings with regard to classroom approaches are sporadic and disappointing. Squire concluded his review by stating

that personal qualities of the teacher are critical in developing pupil attitudes toward reading.

McMillan (in press), interviewed a random sample of 53 junior high school students to assess perceptions of school influences on their attitudes toward science. Questions focused on influences of the teacher, amount of effort in studying science, parents' feelings about science, rewards, and the relationship between enjoyment and perception of usefulness. Results showed that the best-liked aspect of the curriculum involved active participation, that teacher characteristics (personality and behavior) are crucial influences, both positively and negatively, that effort exerted toward science was important (the more effort the better the attitude), and that students differentiated between liking science and thinking it was useful.

In summary, the literature identifying factors which affect attitude development seems to suggest that a few variables are especially influential. These include factors related to the teacher in the class (teacher enthusiasm and attitude toward the subject, how well liked the teacher is by students, reward giving, keeping the subject relevant or interesting) and factors which affect attitudes before the students enter a particular classroom (parental attitudes, self-concept, prior attitudes toward a subject). The problem with much of this research, however, is that many of the "important" factors are difficult to specify in hypothesizing a general theory of attitude formation. What is "relevant" in one class is boring in another. What does a "positive attitude" of a teacher toward a subject

consist of, and is this attitude manifest in a similar way across subjects and grade levels? That is, it is difficult to suggest, from this research, specific activities or behaviors teachers could engage in to improve student attitudes. The second type of research seeks to answer these questions by examining systematically the relationship of one or two factors to attitudes.

Correlational Studies of Specific Factors

An important word of caution is needed in interpreting these correlational studies. This type of research does not imply that a certain factor caused the change in attitude for two reasons. First, the direction of inferred influence cannot be determined. It is just as likely, for instance, that a favorable attitude helped to create a positive classroom climate as the climate influencing the attitude. Second, other unmeasured factors associated with the factor may be more important. Thus, a positive climate may be highly related to self-concept, and it could be the latter variable which is most influential. Given these limitations, the correlational research is important in suggesting studies to determine causal relationships.

Instructional Methods

There are examples of specific instructional methods which are related to attitude development. However, it seems likely that many of these instances were successful in altering the classroom climate, teacher-pupil interaction, self-concept, or other conditions which result in more positive attitudes. For example, Kokovich and Matthews (1971) found that sixth graders with poor self-concept who tutored first graders in reading developed more positive self-concepts toward

reading. Healy (1965) found that fifth grade students developed positive attitudes toward reading if they were allowed to choose reading groups, select reading material, plan creative activities and use reading partners. McTeer, J. H., and Jackson, J. L. (1977) report a small but significant difference in student attitudes toward history favoring a teach teaching approach as compared to traditional methods. Teaching methods which result in closer student-teacher contact show more positive attitude development (MacDonald, Harris, and Mann, 1965-66; Marita, 1966-67). Gurney (1966) used a special program of individualized instruction in reading with fourth graders which resulted in better attitudes toward reading. Self-concept of ability in reading could have been affected using this method. Bloom (1976) has reported a positive relationship between attitudes and the use of a mastery approach in teaching, and suggests that experiencing success in the subject is associated with feelings of self-worth and favorable self-concept. Doyle (1978) suggests that attitudes toward subject matter are influenced by classroom task ambiguity and risk. These affect generating factors are the results of how academic tasks are structured. Thus, it appears thatcurriculum, class activities and classroom organization can affect attitudes, but that the causal variable is determined by how these factors influence the social-emotional climate in the classroom.

Other studies of specific methods do not clearly relate to generic factors such as self-concept, classroom climate and teacher-student relationships. For example, Smith (1967) demonstrated that the assignment of creative writing tasks prior to reading a short story favorably

affected the attitudes formed toward the story.

Although other studies indicate that a specific instructional approach or activity can promote more positive attitudes, several researchers have reported that most of this type of research has produced non-significant results (Aiken, 1970, 1976; Alexander and Filler, 1976; McMillan, 1976; Squire, 1969). Gardner (1975), for instance, reviewed about 30 studies which compared innovative and traditional science curricula, and concluded that there was little difference in pupil attitudes toward science as a result of enrollment in a specific curricula. Even significant results only mean that a particular method, used with certain students under certain conditions had at one time affected attitudes. This type of conclusion is so severely limited in external validity as to render it useless with respect to theory development and confirmation.

Teacher Attitude and Enthusiasm

Several correlational studies have supported the general finding that teacher attitude and enthusiasm is an important factor in student attitude development. In a survey of 1,672 earth science students and 43 teachers in 28 schools, Yoveff (1972) found a statistically significant positive correlation between interest in the course and student ratings of teachers. However, the student self-report data collected in the study did not include a pre-test and did not use a standardized instrument to measure interest toward earth science. Phillips (1973) traced pupil attitudes back through fourth, fifth, and sixth grades and found similar positive correlations. Garner (1963) administered an inventory to measure 45 first-year algebra teachers' and their 1,063

students' attitudes toward algebra. He found a significant relationship between teachers' attitudes toward algebra and student attitudes toward algebra, and teachers' and students' judgments concerning the practical value of algebra. Stedman and Breen (1977) correlated interests of 12 first grade teachers in language and writing, mathematics, social science, and natural science, as measured by the Strong Vocational Interest Blank, with 60 pupils' attitudes in the same areas. Only the natural science area showed a significant relationship. Pupils that had teachers with high interest reported more positive attitudes than did pupils with teachers who had low interest. However, Lawrenz (1975) measured teacher and pupil attitudes toward science in 236 secondary science classes in 14 states and failed to find a significant relationship.

In a well designed and carefully conducted study, McConnell (1973) found several significant relationships between teacher behaviors and ninth grade student attitudes toward algebra. His sample included 50 classes from 13 Chicago suburban high schools. He used class means as the unit of analysis and regressed post test attitudes against pre test aptitudes, achievements, and attitudes, then correlated residuals with teacher behavior measures. He found that both pupil and observer assessments of teachers who demonstrated more clarity, enthusiasm and task orientation were significantly related to positive attitude development. He also found that teachers whose pupils rated them as emphasizing analysis of questions and activities over other forms of cognition viewed mathematics as harder, duller, and less attractive.

Classroom Climate

Another variable related to teacher behavior is the classroom climate the teacher fosters and the impact of this climate on student attitudes. Walberg (1969) used bipolar adjective scales to measure three aspects of students' attitudes toward physics; interesting-dull, exciting-boring, and stimulating-monotonous. He also measured the classroom climate of the physics classes of these students, using the Learning Environmental Inventory (LEI) (Walberg and Anderson, 1972). This instrument measures class organization, goals, student cliques and friendships, difficulty of class work, and other aspects of the atmosphere of the class. He found a statistically significant and positive correlation between the LEI and physics interest and the LEI and enjoyment of doing class work.

Several other studies have found a significantly positive relationship between the classroom climate as determined by the LEI and attitudes toward the subject matter of the class (Anderson, 1970; Anderson and Walberg, 1968; Lawrenz, 1976; Walberg, 1971; Walberg and Anderson, 1972). However, Lawrenz (1975), in his study of characteristics of secondary science teachers and their classes did not report a significant relationship between the LEI and pupil attitudes. Rees and Peterson (1965) found a positive correlation between cooperative attitudes, an important aspect of climate, and favorable evluations of poetry. Johnson and Johnson (1974) cite several other studies which showed that students' attitudes toward school subjects were more favorable in cooperative rather than competitive environments.

Praise and Incentives

A third class of variables which has received some attention is the nature and use of praise and incentives. Neidt and Hedlund (1967) found a small positive correlation, after partialing out aptitude, between attitudes and final course grades with 573 university students in three courses. Teigland (1966) also found a positive relationship between higher grades and the formation of positive attitudes with college students. However, Ryan (1968) found that there was no relationship between grade giving and attitudes on a large sample of junior high students, and Orbaker (1972) found that verbal praise did not affect the attitudes of college students toward physical education. Hake (1973) found that eighth grade mathematics students who received either written praise, personal comments, or no comments did not differ in the attitudes they formed. The results of these studies seem contradictory, and need to be put into perspective considering the large number of studies which have indicated a positive relationship between achievement and attitude.

Theoretically, grades can be viewed as either extrinsic or intrinsic rewards, depending on the meaning of the grade to the student. If the grade indicates achievement and can be equated with "success," then the grade will have meaning; it will affect the self-image of the individual. This emotional feeling of competence will likely be associated with the subject and tend to foster a positive attitude toward the subject. On the other hand, if the grade is meaningless and is only an extrinsic incentive to do the work, then the effect of the grade may be quite complicated, depending on the conditions under which the grade was given.

Much of the experimental research in attitude formation concerns the use of rewards. These studies help to explain the correlational findings.

Experimental Studies of Specific Factors

Praise and Incentives

Deci (1972) found that the tendency of college students to engage in the intrinsically rewarding activity of solving a puzzle would lessen if money was given as a reward for performing the task. Seemingly, the subjects viewed the activity as dull if extrinsic rewards were present to "bribe" the subjects. Lepper, Green, and Nisbett (1973) measured the effect of rewards on the intrinsic value of drawing of preschool children. Three groups of children were used in the study; one group agreed to receive a reward for drawing; the second group received an unexpected reward; and the third group was given no reward. The group which expected and received the reward showed less interest in drawing at a later time than the other two groups.

Kruglanski, Alon, and Lewis (1972) studied the relationship between extrinsic rewards and task enjoyment. Children ten to eleven years old were either rewarded or not rewarded after winning various group competitions. The rewarded group rated the tasks as less enjoyable than the non-rewarded children. Kruglanski, Friedman and Zeevi (1971) studied fifteen to sixteen year olds performing several recall and creativity tasks. One group of students was rewarded by a visit to a university psychology department (this activity was previously determined to be a useful reward); the other group was not rewarded. The ratings of recall and creativity task enjoyment were higher for the

no-incentive group than for the rewarded group.

The incentive related research seems to indicate that an extrinsic reward may mitigate the intrinsic value and enjoyment of a task if administered in a certain manner. This finding is based on cognitive dissonance and attributional theory, but is complicated by the conditions necessary to result in a dissonance prediction. For instance, laboratory studies have found that dissonance results will be attained under conditions of high consequences of the task to the learner, (Calder, Ross, and Insko, 1973), choice in engaging in the task (Linder, Cooper, and Jones, 1967) and high commitment to the task (Frey and Irle, 1970). The opposite conditions will result in incentive predictions.

Further, it has been found that certain personality characteristics will determine a person's perception of the causes of success or failure, and that the source of causality influences the affective consequences of achievement outcomes (Weiner, 1977). While this area of study is relatively new, it has important implications for this discussion. It has been found that persons who have a need for achievement (high achievement motivation) attribute "success" to the internal factors of ability or effort in the task, whereas persons who have a need to avoid failure (low achievement motivation) attribute success to external factors such as luck or ease of task and attribute failure to internal causes. Thus, success experiences for a student high in achievement motivation will lead to positive emotional consequences associated to self-concept, while the low achievement motivator feels little satisfaction or pride since the reason for success is external.

Swanson (1972) studied some of the dissonance conditions mentioned above in an educational setting. She found a significant difference between choice and no-choice conditions in attitudes toward a reading assignment while not finding either a dissonance or incentive effect. The Swanson study is interesting since it attempts to replicate a laboratory design with junior high students. The results suggest that the high-choice group may have been biased toward more positive attitudes in general toward school activities, and this bias may have been stronger than dissonance or the incentive conditions. The previously mentioned Orbaker study should have revealed more positive attitudes since commitment and choice could be considered low in the class he used. However, it seems probable that the attitude he measured toward physical education is well-established and consistent by junior high school students, and consequently would not show much change under any conditions. This hypothesis indicates that prior attitudes are important determinants of attitude development, and should be controlled in studies of attitude change.

The dissonance literature has identified choice, commitment, and consequences as significant variables in a situation where incentives may be critical in forming attitudes. A required class could have low choice but have high commitment and consequences. The theoretical outcome of such a situation is that external incentives will improve student attitudes. An elective course could have the opposite effect. if the reward is intrinsic, then attribution theory would apply to the situation, and different results could be expected. This points out

the complex effect of different types of reward on attitude development.

Effort

One of the basic notions of cognitive dissonance theory is that when a person exerts great effort with little justification, he will view the effort and activity favorably to reduce dissonance. In such situations, a person must have some reason for exerting the effort. With no external reward or reason the activity itself is valued (Festinger, 1961). This argument is reasonable from an intuitive point of view, and there is some empirical evidence to support this notion with students' school attitudes.

Buenz and Merrill (1968) tested this hypothesis with 66 nursing students. The subjects were divided into high and low effort groups. The low effort group was required to write one-word answers to questions which were interspersed throughout a film on nursing. The high effort group wrote a short essay justifying each answer in addition to the one-word response. The subjects were given three attitude questions, measuring enjoyment of the experiment and perceived effort expended. The analysis indicated that the high effort group expended significantly more effort than the low effort group, and showed that greater enjoyment was reported in the direction of the dissonance prediction. The high effort group enjoyed the learning task more than the low effort group. Kauchak (1973) studied the effects of high and low effort with 112 junior college students. In his study, one group was given the task of constructing questions and objectives concerned with Bloom's taxonomy, while the second group did the same but also wrote

essays on how the taxonomy might be used to improve instruction in their particular discipline. Again, the high effort group indicated a more positive attitude toward the task than the low effort group.

Some research has studied the interaction of degree of effort with reward. Aronson conducted a laboratory study in which subjects were required to exert either high or low effort in attaining a reward of money. The amount of money received was also high or low, producing a 2 x 2 research design (Aronson, 1961). He found that in a high effort condition, high and low reward groups formed similar attitudes, while in the low effort condition high reward students formed more positive attitudes than low reward students. The extrinsic reward of money was balanced by dissonance only when high effort was involved. Dissonance was not experienced in the low effort condition. In a replication of Aronson's study, McMillan (1976) found a significant interaction between an intrinsic reward and effort. College students were given high or low effort assignments and randomly given high or no praise for their work. The assignments were a natural part of the class, and the students were unaware that they were subjects in an experiment. The results showed that students who exerted high effort and received high praise reported significantly more positive attitudes toward the assignment than students who exerted high effort and received no praise feedback or exerted low effort regardless of feedback.

Merrill, Yaryan, and Musser (1969) extended Aronson's design to study medical students' attitude toward programmed material. They used two levels of effort and four levels of reinforcement of correct

answers. The dependent measure, enjoyment of the experiment, showed no dissonance or incentive effects. The authors account for the finding by suggesting that the measure of enjoyment was unsatisfactory.

Other Significant Factors

A few experimental studies have been done in other areas but because there are so few they will not be treated in separate sections.

Lowerey (1967) conducted an experimental study of the effect of using a unit on animal coloration compared with an ordinary unit and found significantly more positive attitudes toward science with students who used the experimental unit. Patsloff (1967) manipulated teachers' attitudes toward education materials by randomly assigning the teachers to different workshops to learn about the material. The classes of the most and least enthusiastic teachers toward the materials after the training were compared. Patsloff found that students of highly enthusiastic teachers developed a more positive attitude toward the subject than students of un-enthusiastic teachers. However, only 8 teachers were used in the study; statistically significant results were not attained; and the highly enthusiastic teachers taught all female classes. In a laboratory study, Bostrom, Vlandis and Rosenbaum (1961) had subjects write counter attitude essays and randomly distriubted an A, D or no grade to the essays. They found that when the original attitude questionnaire was readministered directly after receiving the grades, those subjects given an A changed their attitude more than those given a D or no grade.

In a series of quasi-experimental studies, Bloom and his students (Bloom, 1976) report that increases in interest and affect toward a

subject is greater for mastery approaches to instruction than non-mastery lessons. In each of the studies, however, the mastery group initial interest was higher than the non-mastery group, and statistical differences were not indicated. The group differences could explain the results, since students who had a higher initial interest could be expected to change more in a positive direction than students lower in interest.

Summary

Unfortunately, most of the research reviewed has used a simplified global measure of attitude. Such an approach ignores the actual complexity of the "attitude," and does not reflect the various dimensions of the construct (McMillan, in press). A multidimensional measure is the only accurate approach, and there is no reason why, given the development of multivariate statistics, the more complex measurement should not be used. For instance, some variables may differentially affect the value one associated with a subject area and how well one enjoys the subject. These two dimensions, valuing and enjoying, are usually considered together as one construct.

The literature reviewed, while neither plentiful nor conclusive, has suggested that certain factors and conditions influence students' attitude development. Much of this research, however, is correlation, and cannot be cited as evidence that these factors cause the attitudes. Prior attitudes certainly will influence attitude development in the future. This suggests that any study designed to measure the impact of certain factors on attitude formation must take into account the initial attitudes the pupils bring toward the subject. A second

factor which seems to be important is the attitude and enthusiasm of the teacher toward the subject taught. The evidence indicates a positive relationship between a teacher's favorable attitude and enthusiasm toward a subject and attitudes and relationships with students Again, this factor should be accounted for in studies of actual classrooms where it could influence attitude development. The same is true for a third factor, classroom climate. Some evidence suggests that a positive class environment is related to positive attitudes toward the subject of the class. Classroom activities which are relevant, fun, challenging, or enjoyable constitute a fourth class of variables which may have a positive impact on attitude development.

There is no clear indication of how rewards influence attitudes students develop toward school subject. The impact of rewards seems to depend on: 1) whether they are intrinsic or extrinsic; 2) whether they follow an already interesting task or a boring task; 3) to what the individual attributes the outcome; 4) how choice, commitment and consequences are perceived; and 5) the degree of effort put forth in the task. There is evidence that rewards which are intrinsically meaningful will affect student attitudes toward school subjects, while extrinsic rewards probably do not have much effect on attitudes toward a specific subject (with the exception that an extrinsic reward for an enjoyable task may lessen subsequent interest in the task and the subject related to the task).

It is encouraging to note that many of the factors which seem to influence attitudes can be manipulated by the teacher. That is, the teacher is primarily responsible for establishing a positive climate,

providing meaningful success experiences, dispersing rewards, making assignments which require high or low effort, affecting students' self-concept, the attitudes, enthusiasm and knowledge they present to the students. It is also encouraging that these behaviors and factors are not bound by either grade level or subject matter. Few studies have found that a particular curriculum or instructional method has a consistent effect on attitudes. This suggests that the everyday teacher-student interactions and relationships which determine classroom climate, dispersal of rewards, etc., are the most critical variables, regardless of instructional materials, in influencing attitudes toward school subjects. Thus, further experimental research of these variables may lead to generic theories to explain how attitudes are formed and those specific teacher behaviors which can promote more favorable attitudes. There have been sufficient descriptive and correlational studies to warrant causal research. The use of experimental and quasi-experimental designs to better approach causal inference, along with a multivariate measurement of attitude, is the needed direction for future research in this area.

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